40. The bus system as recited in claim 39, wherein a bus element includes a CPU.

IN THE ABSTRACT

Page 46, line 1, delete the title and insert -HIGH SPEED BUS SYSTEM THAT INCORPORATES UNI-DIRECTIONAL POINT-TO-POINT BUSES-

REMARKS

I. INTRODUCTION

In the April 15, 1992 Office Action, the Examiner rejected claims 1-36 for indefiniteness under 35 U.S.C. § 112, second ¶, and rejected claims 1-19, and 30-35 for obviousness under 35 U.S.C. § 103. Herein, applicants will demonstrate that these rejections have been traversed and should be withdrawn.

Applicants note the Examiner's suggested changes to the drawings in numbered Section 3. Applicants will make the suggested changes and file formal drawings once the claims have been allowed and before the issue fee is paid.

II. REJECTIONS

The present invention contains 36 claims. Of these claims, claims 1, 30, and 33 are independent claims and claims 2-29, 31-32, and 34-36 are dependent claims.

The Examiner has rejected claims 1-36 under 35 U.S.C. § 112, second ¶, for indefiniteness. Of these claims, the Examiner has stated substantive grounds for rejecting claims 1-2, 4-7, 21, 24-25, 27-28, 30, 33, 35, and 36. The remaining claims, claims 3, 8-20, 22, 23, 26, 29, 31-32, and 34 were rejected under 35 U.S.C. § 112, second ¶, because of their dependency from base claims rejected for indefiniteness.

The Examiner also has rejected claims 1-19 and 30-35 for obviousness under 35 U.S.C. § 103 based on the combination of U.S. Patent No. 4,837,682 to Culler (Culler) in view of U.S. Patent No. 4,470,114 to Gerhold (Gerhold). In support of the rejection, the Examiner also referred to U.S. Patent No. 5,072,363 to Gallagher (Gallagher).

Applicants will demonstrate that the indefiniteness and obviousness rejections have been traversed and should be withdrawn.

III. TRAVERSE OF 35 U.S.C. § 112, SECOND ¶ REJECTION

Applicants have reviewed the Examiner's bases for rejecting the claims under 35 U.S.C. § 112, second ¶, for indefiniteness. Applicants have amended the claims to overcome these bases for rejection. Applicants, however, have not amended the claims 1 and 33 with regard to the term "bus elements," and claims 2 and 5 with regard to term "state devices." Applicants have added new claims 37-38 for claim differentiation with regard to "state devices" and new claims 39-40 for claim differentiation with regard to "bus elements." Accordingly, the indefinite rejections based on applicants use of the terms "bus elements" and "state devices" are overcome.

Noting the foregoing, applicants have traversed the Examiner bases for rejecting claims 1-36 for indefiniteness, and the rejection should be withdrawn.

IV. TRAVERSE OF THE OBVIOUSNESS REJECTION

A. Legal Precedent

The test for obviousness under 35 U.S.C. §103 by the Court of Appeals for the Federal Circuit is whether the claimed invention as a whole, in view of the prior art taken in their entirety, would have been obvious to a person of

ordinary skill in the art. Connell v. Sears, Roebuck & Co., 722 F.2d 1542, 1549 (Fed. Cir. 1983). Furthermore, "the inquiry is not whether each element existed in the prior art, but whether the prior art made obviousness the invention as a whole for which patentability is claimed." Hartness Int'l, Inc. v. Simplimatic Eng'g Co., 819 F.2d 1100, 1108 (Fed. Cir. 1987). When multiple prior art references are relied on as a basis for rejecting claims of an application for obviousness, in order for such prior art references to be combined to form an obviousness rejection under 35 U.S.C. §103, there must be a suggestion or incentive to do so. ACS Hosp. Systems, Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577 (Fed. Cir. 1984).

References that are relied on in rejecting claims of an application must be evaluated as a whole for what they fairly teach and neither the references' general nor specific teachings may be ignored. Application of Lunsford, 357 F.2d 385, 389-90 (CCPA 1966). Thus, any reference must be considered for all that it teaches, not just what purportedly points toward the invention but also that which teaches away from the invention. Ashland Oil, Inc. v. Delta Resins & Refractories, 776 f.2d 281, 296 (Fed. Cir. 1985). Further, a person of ordinary skill in the art must find that the cited combination, in and of itself, without benefit of the invention under consideration, must render the invention as a whole obvious. Application of Sponnoble, 405 F.2d 578, 585 (CCPA 1969).

Finally, the Examiner must not use hindsight in reaching an obviousness conclusion. Grain Processing Corp. v. American Maize-Products Co., 840 F.2d 902, 907 (Fed.Cir. 1988); Orthopedic Equipment Co. v. United States, 702 F.2d

1005, 1012 (Fed.Cir. 1983).[1] The Examiner does not follow these precedents in reaching conclusion that the present invention is obvious.

B. Prior Art Relied Upon By The Examiner

1. Culler

Culler discusses a bus arbitration system for use in data processing. This system operates on clocked cycles for determining the priorities for access to both the system memory and the local memories. More specifically, Culler discloses that when a processor unit is denied access to a system bus, a request should be granted to the processor unit to access its associated local memory over its local bus associated with that processor unit and then only in the absence of a conflict for the same associated local memory.

2. Gerhold

This patent describes a interconnect network for a large number as processors from as few as five to a hundred or more, when the information transfers are sized-by-byte in a time multiplexed manner so that when one or more processors is ready to transmit, there will be an information byte being transmitted every clock cycle. A bus arbiter controls access to a local bus in a round-robin manner when one or more processors require a local bus. The bus arbiter also serves for connecting an overall global loop of bus arbiters.

3. Gallagher

Gallagher generally discusses a circuit for round-robin arbitration between requests for access to a shared resource. Further, Gallagher discusses a system where the shared resource is a data bus and the system provides a first option for a round-robin arbitration system between different

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[1] See Gillette Co. v. S.C. Johnson & Son, Inc., 919 F.2d 720, 726 (Fed.Cir. 1990); In re Bond, 910 F.2d 831, 834 (Fed.Cir. 1990).

bus access requests, as opposed to a normal priority arbitration system.

C. Traverse Of The Obviousness

1. The Examiner's Support For His Rejections

The Examiner states the following in support of his obviousness rejection as applied to claim 1:

> "As per claim 1, Culler teaches the claimed:
>
> 'a plurality of bus elements': Culler's plurality of bus elements (See Fig. 6, elements 508, 544, 548, 522 and 528);
>
> 'a central unit having a plurality of bus inputs and an output': Culler's central unit having a plurality of bus inputs and at least one output (See Fig. 5, element 600); and
>
> 'arbitration logic granting the bus elements through the central unit': Culler's arbitration logic granting access to bus elements (See col. 8, lines 36-42).
>
> "The difference between the instant claim and the reference of Culler is that the reference does not explicitly show the limitations of 'a first plurality of uni-directional point-to-point buses ... and a second plurality of uni-directional point to point busess ...' (lines 6-11). However, Gerhold in a similar system teaches uni-directional buses between devices (See col. 4, lines 49-51). It would have been obvious to one of ordinary skill in the data processing art at the time the invention was made to implement uni-directional buses rather than bi-directional buses because such modifications will help to accomplish efficient high speed processing (Gerhold teaches that in col. 8, lines 5-7).
>
> "Furthermore, the above prior art does not explicitly show 'coupling at least one of the inputs to the output.' However, this can be interpreted as a 'special interrupt' trying to get access directly by-passing an arbitration logic which is well within the skill of ordinary person in the data processing art. Evidence of this is provided by US Patent 5,072,363 issued to Gallagher (See col. 2, lines 10-13). It would have been obvious to one of ordinary skill in the data processing art to implement the above feature in the above prior art of Culler in view of Gerhold because the prior art of Gallagher shows several types of

arbitration scheme suitable for individual systems (See col. 2, line 61-col. 3, line 14 of Gallagher) and to select anyone is a matter of specific design choice." (Emphasis in original.)

The Examiner states the following support for rejecting claims 2-4:

"As per claims 2-4, the limitations of the claims, i.e., 'system further includes a state device' (claim 2), use of 'OR gate' (claim 3), 'multiplexer' (claim 4) do not patentably distinguish over the prior art because these are art recognized equivalents and thus it is a matter of specific engineering choice."

The Examiner states the following in rejecting claims 5-19, 30, and 31-33:

"As per claims 5-19, these claims are rejected for similar reasons as in claims 2-4.

"As per claim 30, this claim is rejected for similar rationale as in claim 1.

"As per claims 31-32, these claims are rejected for similar reasons as in claims 2-4.

"As per claim 33, this claim recites a method which parallels apparatus claim 1. In teaching the construction and use of the device the prior art of culler in view of Gerhold inherently teaches a corresponding method."

And finally, the Examiner's grounds for rejecting claims 34 and 35 is the following:

"As per claim 34, culler [sic] teaches the claimed:

'wherein the bus elements include a plurality of central processing units and a shared memory': Culler's <u>bus elements include a plurality of central processing units and a shared memory</u> (See Fig. 6).

"As per claim 35, Culler teaches the claimed:

'selecting step further comprises selecting between the inputs on the first buses from the central processing unit and the bus from the memory': Culler's <u>selecting inputs from the processors and memory</u> (See col. 8, lines 12-25)." (Emphasis in original.)

2. Claims 1-19 and 30-35 Are Not Rendered Obvious By The Combination of Culler, Gerhold, and Gallagher

The Examiner's statements regarding claim 1 demonstrate only that he attempts to find the common components of present invention and Culler. However, if Culler is reviewed from the whole of which it teaches, it is found that it describes a bus system in which each processor unit is connected through a local bus to its associated local memory, and a system bus interconnects the processor units and local memories in parallel to the local bus. When a processor unit is denied access to the system bus, and there is not a conflict in requesting the same associated local memory, a processor request is granted for the requesting processor unit to access its associated local memory over its local bus during the clock cycle. This structure is necessary for the Culler system to operate properly.

As is plain from a review of the present application and claim 1, the claimed invention does not have associated local buses in parallel with a system bus as the Culler describes. As such, access cannot be granted to the associated local bus if access is denied to the system bus, as Culler discloses. Reference to Culler for its alleged elements that are the same as those in claim 1, is improper because the Examiner does not view the identified elements in the proper context or the alternative system that Culler teaches. If that were done, a person of ordinary skill in the art would find that Culler does not teach or suggest or render obvious claim 1 of the present invention.

Moreover, Culler does not teach the use of uni-directional buses to gain speed and signal quality advantages. This is yet another ground that supports applicants' position that claim 1 is not obvious in light of Culler when it is the

primary reference relied upon for rejection. Therefore, applicants assert that Culler cannot be relied upon as the primary reference of any combination where the other reference combined with it are meant only to teach very specific features of the claimed invention.

With respect to the Gerhold, the Examiner combines the teachings of this patent with those of Culler. The Examiner contends that Gerhold discloses the use of uni-directional buses to accomplish efficient high speed processing. Applicants respectfully disagree.

Gerhold does discuss the use of uni-directional buses (column 4, lines 49-51), however, these disclosures provide nothing that would teach a person skilled in art to use uni-directional buses to achieve high speed processing and its asserted advantage as provided by the invention of claim 1.

The portion of Gerhold that the Examiner cites relates to a discussion of the entire system, including the overall global loop of bus arbiters, where the information transfers are serial-by-byte in a time multiplexed manner. Accordingly, the Examiner's citation to Gerhold does not support what the Examiner alleges it teaches. Thus, the Examiner's citation to Gerhold is misplaced and this reference should be withdrawn as a reference relied upon by the Examiner. Further, there is nothing within the four corners of Gerhold that suggests combining uni-directional buses expressly for the purpose of achieving the efficient, high speed processing as set forth in the claimed invention.

Applicants further assert that there is no suggestion or incentive in Gerhold or Culler to combine the teachings of the two references. Furthermore, neither of these references discusses generally or specifically the

combining of the functionality of conventional multi-drop buses, such as only allowing one bus element access to the bus at a time and the common visibility of each transaction by all bus elements, with the speed and signal quality advantages of uni-directional point-to-point buses. Noting the foregoing, the combination of Culler and Gerhold does not render obvious claim 1 of the present application.

With respect to Gallagher, the Examiner does not rely on Gallagher in his grounds for rejection for obviousness. What he cites Gallagher for is that it teaches several types of arbitration schemes. However, the Examiner applies the teachings of Gallagher without looking carefully as to whether combining Gallagher with the other reference forms an operable system. If this were done, an operable system would not result as would be known by a person of ordinary skill in the art because of the particulars of Culler, Gerhold, and Gallagher. Furthermore, there is nothing in Culler or Gerhold or Gallagher that supports that these three patents should be combined or even any two of them should be combined.[2]

Noting the foregoing, applicants have traversed the Examiner's basis for rejecting claim 1 with respect to the combination of Culler, Gerhold, and Gallagher, and applicants request that the rejection be withdrawn.

The Examiner has rejected the other claims, claims 2-19 and 30-35, based on the combination of Culler, Gerhold, and Gallagher. Since all of these claims include features drawn to the uni-directional bits for speed of operation and other advantages, the arguments that applicants advanced with

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[2] Gallagher discusses a system for round-robin arbitration between requests for access to a shared resource, such as a data bus. Gallagher does not, however, suggest using such a system in a bus system together with uni-directional buses and a plurality of bus elements.

regard to claim 1, applied equally to claims 2-19, and 30-35 and are incorporated by reference. As such, applicants traverse the obviousness rejection as it applies to claim 2-19 and 30-35.

Noting the foregoing, claims 1-19 and 30-35 are in condition for allowance. Therefore, please withdraw the obvious rejection applied to claims 1-19, and 30-35.

V. CONCLUSION

Applicants have traversed the Examiner's rejection of claims 1-36 with respect to the various grounds enumerated in the Office Action of April 15, 1992, thereby placing the application in condition for allowance.

The present invention is new, non-obvious, and useful. Reconsideration and allowance of the claims are requested.

Respectfully submitted,

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